

# Photometer applications in a polyurethane process

## PIR3502 and PUV3402 Multiwave process photometers



Increase the efficiency of the polyurethane process.

**Measurement made easy**

PIR3502 IR process photometer

### Industries

Chemical | Petrochemical

### Introduction

Polyurethanes are produced by reacting diisocyanates with polyols and other chemicals. Approximately 90% of phosgene production is used in the manufacture of isocyanates for polyurethane resins. Nearly all phosgene is used at the point of manufacture due to its reactivity and toxicity. ABB photometers can measure key components in the polyurethane process. The continuous measurements provided by filter photometers allow for a fast response to process changes for better control, safety, and process optimization.

### The analyzer

The ABB process photometer is a multiple channel, fixed wavelength photometer that can accommodate up to eight different optical filters. It ratios the energy from a measure wavelength filter (where the component of interest absorbs energy) to a reference wavelength filter (where none of the components absorb energy). Infrared (IR), near infrared (NIR), and ultraviolet (UV) photometers are used to measure the key components in the polyurethane process. These photometers have established an excellent reputation for reliable, safe, and stable performance in polyurethane plants.

### Discussion

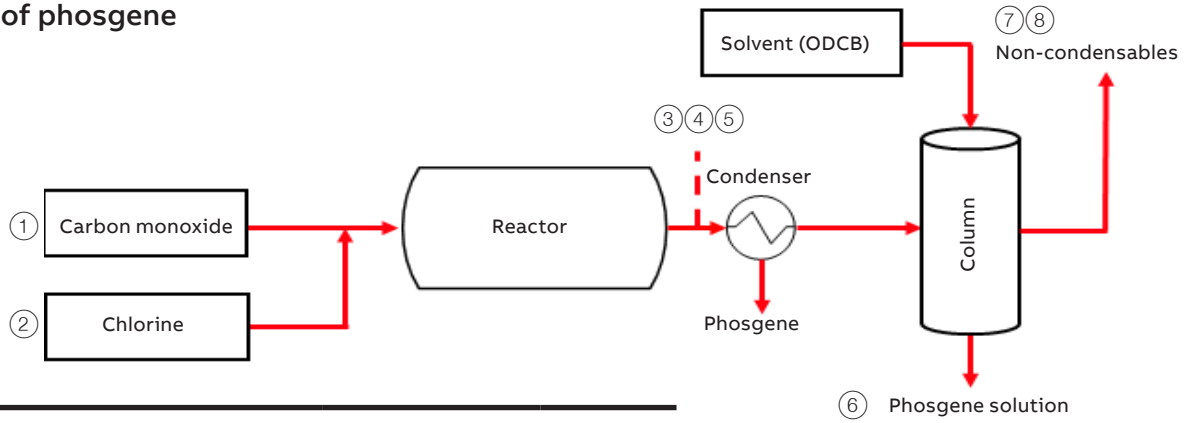
A common synthesis route for the manufacture of phosgene is the reaction of chlorine gas and carbon monoxide in a reactor with an activated charcoal catalyst. Carbon monoxide is held in excess so that the reaction is optimized on the more expensive chlorine component. A schematic of the production of phosgene is shown on the next page. The efficiency and safety of the production of phosgene can be monitored by the previous analyses with the ABB process photometer.

Most of the phosgene is then used in the production of isocyanates which are precursors to polyurethanes. Isocyanate resin is formed from an amine and phosgene. A schematic of the production of isocyanate is shown on the next page. Again the efficiency and safety of the production of isocyanate can be monitored by the analyses with the ABB process photometer.

### Conclusion

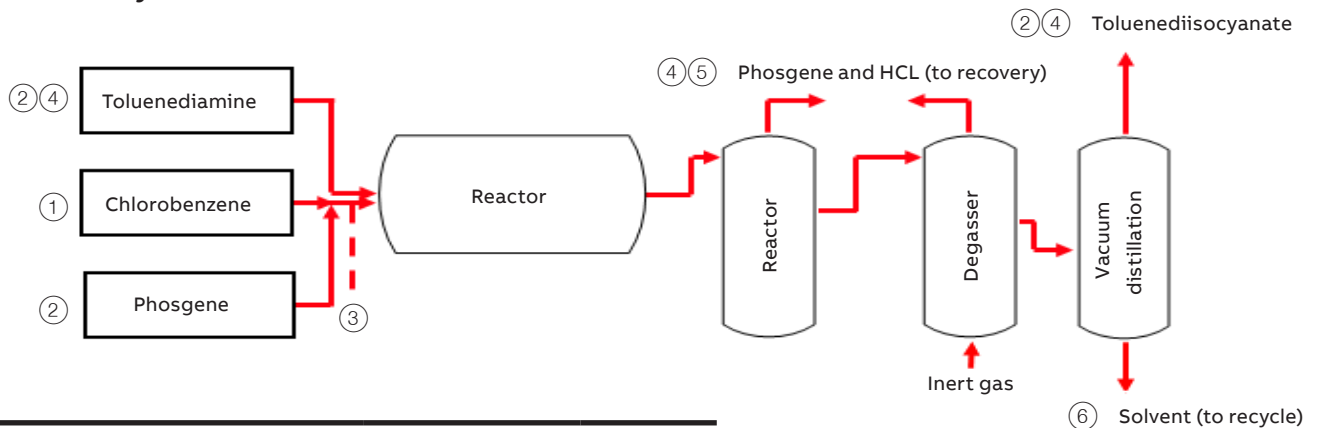
The use of ABB process photometers increases the efficiency of the polyurethane process. The photometer provides a continuous analysis which allows for quick remedial action when the measured components are off spec. The monitoring of phosgene ensures safe operation in the polyurethane process.

## Production of phosgene



Process	Location	Measurement range	Photometer
①	Carbon monoxide in reactor feed	90 to 100 %	IR
②	Chlorine in reactor feed	90 to 100 %	UV
③	Chlorine in reactor outlet	0 to 200 ppm	UV
④	Carbon monoxide in reactor outlet	0 to 20 %	IR
⑤	Phosgene in reactor outlet	0 to 100 %	IR
⑥	Phosgene in solvent wash	0 to 60 %	NIR
⑦	Chlorine in solvent wash vent	0 to 200 ppm	UV
⑧	Phosgene in solvent wash vent	0 to 100 ppm	IR

## Production of isocyanate



Process	Location	Measurement range	Photometer
①	Water in reactor feed	0 to 100 ppm	NIR
②	Phosgene in reactor feed	85 to 100 %	IR
③	Phosgene in solvent solution feed	0 to 60 %	NIR
④	Chlorine in phosgene recovery	0 to 200 ppm	UV
⑤	Phosgene in HCL recovery	0 to 500 ppm	IR
⑥	Isocyanates in solvent recovery	0 to 1000 ppm	IR